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(56) Documents Cited

US 5200991 A US 5123029 A

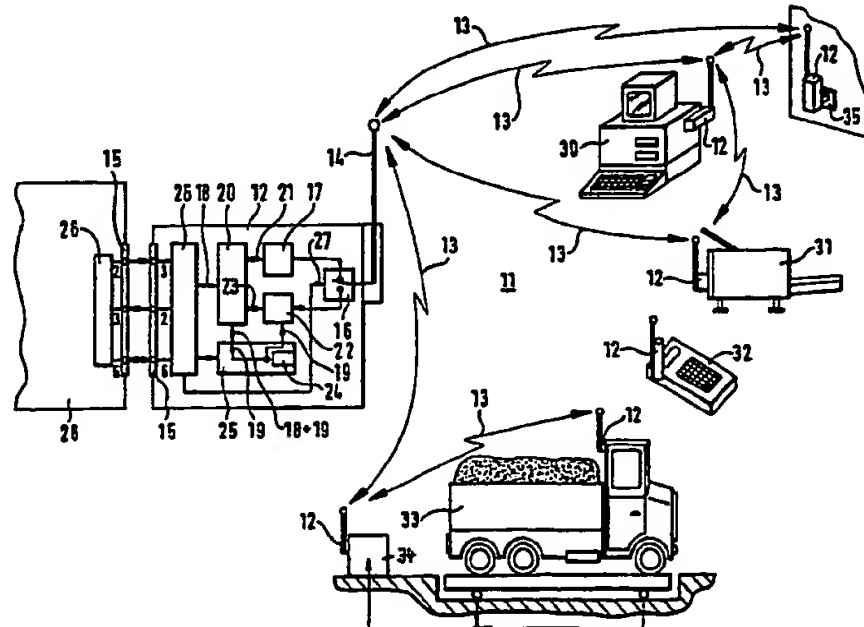
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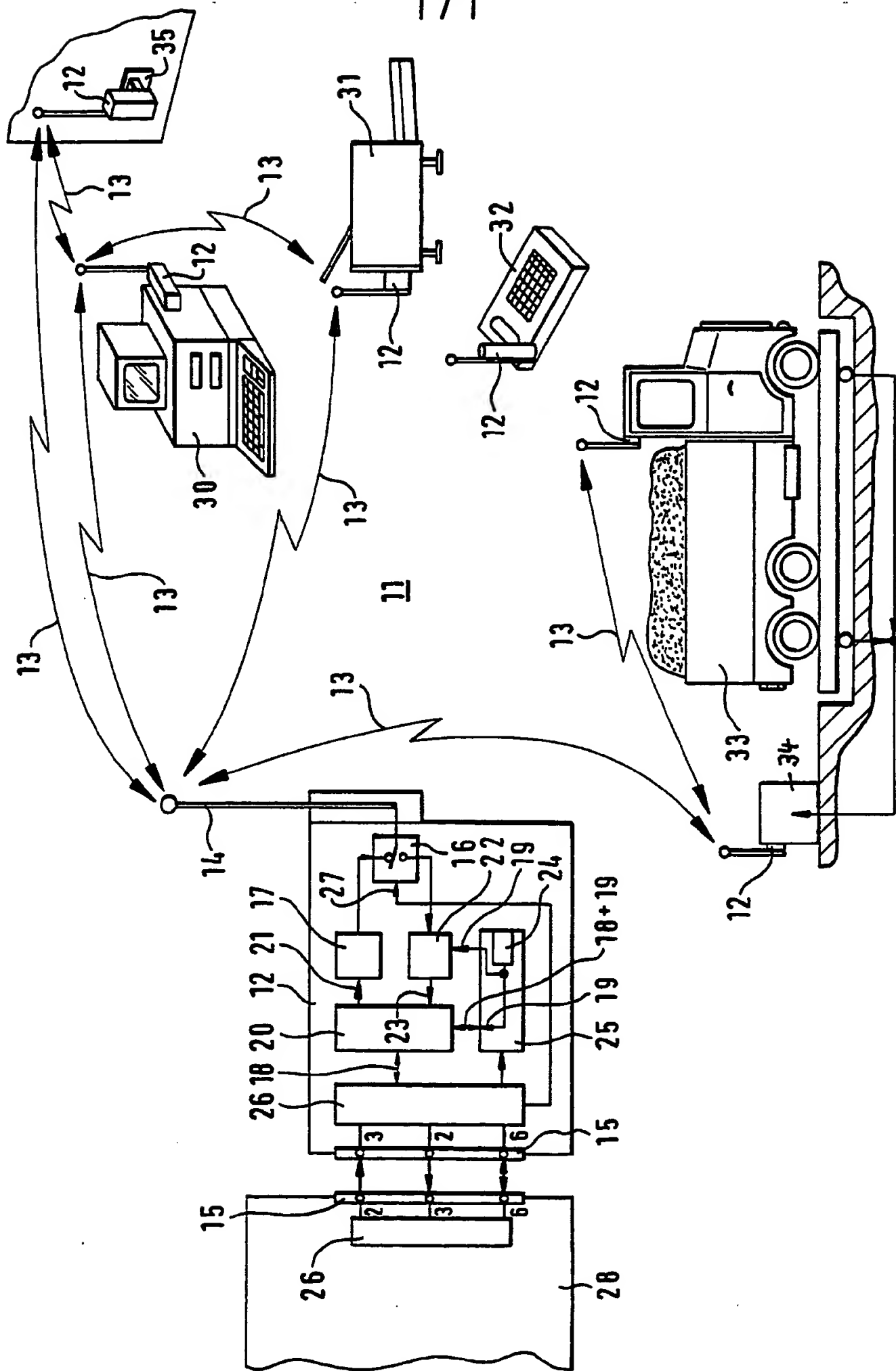
## (54) Information transmission system

(57) An information transmission system along the lines of an internal company data radio (radio LAN) has directly on each radio module 12 a pluggable standard serial interface 15, 26 for the acceptance or delivery of data 18 as well as a rod aerial 14 for the emission and picking-up of the data 18 in the very high frequency range, so that even with propagation through buildings no reception-disturbing phase shifts occur due to reflection phenomena. In addition to the transmitted data 18, an identification signal 19 is emitted in order to only switch certain ones of the available modules 12 to receive the information. The modules 12 can be directly plugged in and operated at the externally accessible serial interfaces of computers 28, 30, printers 31 or peripheral devices 32. The interface 26 in one module 12 can be designed for conversion of information into a telefax protocol, to enable this module 12 to be plugged into a telefax socket 35. Other modules 12 may be used to give instructions to the driver of a vehicle 33 being weighed 34.

Alternative systems replace the aerial 14 with a mains plug for signalling over mains wiring, or use identification signals in a radio-controlled babyphone/alarm so that only one specific receiver is responsive to noise from the baby.



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INFORMATION TRANSMISSION SYSTEM

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The invention relates to the transmission of  
information, such as by a radio information transmission  
5 system.

The basic demands on such a system are discussed in  
the article "Radio networks in the industrial field" by W.  
Franz in "atp Heft" No. 2/1993, Pages 65 f. According to  
10 this, radio LANs, so named there, primarily have advantages  
in local networks of limited range, in which, by reason of  
the environmental conditions, cabling is difficult to  
accomplish or in which one must reckon with frequent  
reconfiguration. On account of the operating restrictions  
15 existing in practice with infrared transmission distances  
practically serviceable products with a transmission  
frequency in the Gigahertz range (GHz) are advertised in  
that article. Deutsche Aerospace meanwhile offers a  
corresponding system, constructed as PC plug-in card under  
20 the name "MeshNet 2". There the aerial is connected via a  
cable to the PC. The transmitter frequency lies at 2.4  
GHz, which, on account of the limited propagation  
conditions in rooms, calls for an information transmission  
by way of distributed relay stations. In this respect, this  
25 corresponds with the method of operation of the internal  
company data radio system "Altair" by Motorola ("Blick  
durch die Wirtschaft", 03.02.1993) which transmits with 18  
GHz. With such microwave transmission systems, it is  
however always disadvantageous that reflection phenomena in

buildings can easily lead to out-of-phase transmission paths and consequently to cancellations of signals. In order to overcome this disadvantage, with the "Altair" system, a multitude of transmitters to be cabled with one another, each with a multitude of differently adjusted or oriented aerials, is provided at great expense in the separate rooms. Then it is constantly checked out via which of the transmitters and via which of its aerial combinations instantaneously optimum transmission conditions are present for a certain receiver. Thereby this transmitter constantly interrogates its receiving environment, to ensure that no unauthorised receiver cuts in, for which purpose identifying information is transmitted by all receivers to the transmitters. This means additional apparatus and data transmission expenditure and consequently significantly limits the efficiency of the system despite greater use of hardware.

In contrast thereto, the present invention is based on the objective of producing a more flexibly usable information transmission system which can be constructed at a more reasonable cost.

In order to enable this objective substantially to be achieved there is provided according to the invention a radio information transmission system, characterised by radio modules equipped with transmitter, receiver and directly connected aerial, these radio modules comprising a

directly pluggable standard serial interface for external connection to a PC, to a peripheral device and/or to a stationary or mobile data acquisition station.

5 In an embodiment of the invention, a small radio module is directly equipped with a small rod aerial and can be connected by way of a plug directly to a standard serial interface as is externally accessible in every PC. This module contains all components for the radio-accurate  
10 coding and transmitting as well as receiving and decoding of data packets including a transmitting/receiving aerial change-over switch, which is controlled from the matching circuit of the interface. The interfaces may include an interface designed for the standard fitting for direct  
15 connection to a telecom facsimile socket. The transmitter works in the very high frequency range (VHF) and consequently in a frequency range which is shaded or masked to a relatively slight extent by parts of buildings and in particular does not have appreciable reflection properties  
20 of a kind having the troublesome result of out-of-phase receiving components, because frequencies of this order readily penetrate ordinary walls and ceilings. The module is normally switched to a standby mode in which much of the internal circuitry is switched off to preserve the fitted  
25 energy source; which circuitry is only switched on when the receiver is actuated by reception of an appropriate signal, e.g. a transmitter may actuate the receiver by transmission of an identification signal for the addressee

module for the reception of a radio data package.

Thus, during installation of the system, it can be established by way of the assignment of identification signals as to which receivers of the modules respond to which transmitters of the modules. In principle, it is also possible for this assignment to be altered subsequently by the user, in that the identification signal, such as a code pattern, may be changed by way of a manually operable control. Thus it can be ensured that specific information (according to the identification signal transmitted with the information) can only be received by certain predetermined modules - the other modules remain inactive as regards receiving the currently transmitted information so that the information does not get into the wrong processing channels and the inoperative modules do not use unnecessary battery capacity.

In each receiver the circuit for comparison of the identification signal is tuned or coded to a specific and individual identification signal so that this module only responds to processing of received information when this information is linked, e.g. prefixed by the transmitter of the transmitting module, with that specific identification signal. For the transmitted information (data packed or radiotelephony) at least one identification signal is attuned or coded in the transmitting module to provide the addressee's identification signal, and the information

delivered to the transmitter is provided with this identification signal.

However every module does not have to have its own  
5 identification signal. If several modules should be  
actuated at the same time, either their different  
identification signals can be transmitted with the  
information; or the transmitted information is only  
provided with one identification signal and the several  
10 different modules are prepared for activation by this  
identification signal.

Such a radio module can be made about the size of a  
large matchbox. It is simply attached to the  
15 intercommunicating equipment (host PC, user PC, peripheral  
device, stationary or mobile data source) and consequently  
immediately facilitates, according to the transmission  
conditions over several hundred metres, a reliable data  
transmission in the band of the mobile radio service which  
20 is not open to the public and is usable free of charge.

In general the first aspect of the invention provides  
a very compact and easily used radio information  
transmission system along the lines of an internal company  
25 data radio (radio LAN) has directly on each radio module a  
pluggable standard serial interface for the acceptance or  
delivery of data as well as a rod aerial for the emission  
and picking-up of the radio-accurate coded data in the very

high frequency range, so that even with propagation through buildings no reception-disturbing phase shifts occur due to reflection phenomena. In addition to the transmitted data, an identification signal is emitted in order to only switch certain ones of the available modules to receive the information. The modules can be directly plugged in and operated at the externally accessible serial interfaces of computers or peripheral devices. The or an interface in at least one module can however be designed for conversion of the information into a telefax protocol, in order to enable this module to operate when directly plugged in to a telefax socket.

The mentioned switching on of the module by means of the corresponding identification signal in the radio information from a transmitter provided for this information transmission also has inventive significance, independent of the operating-data radio, for instance, in relation to intercommunication systems coupled by way of radio transmissions or transmissions via the house mains supply (such as two-way telephone systems and baby monitoring devices), with which in practice a receiver frequently receives another, completely unassociated, transmitter strewing in by reason of spatial or electrical nearness to cause its loudspeaker to emit an extraneous noise or item of information, giving rise to an annoying disturbance. If, in accordance with this aspect of the invention, the receiver is designed to react only to a



predetermined transmitter identification signal, the annoying disturbance is overcome.

The transmitted information need not be a data  
5 packet, but may be an acoustic information transmitted by  
radio or the mains as for example in the case of a radio-  
controlled babyphone for remote nursery monitoring. In  
this case, the identification signal of the microphone  
transmitter ensures that only one specific receiver (for  
10 example in the parents' bedroom) is actuated by a noise  
from the baby, and not receivers operating in the same  
radio band in adjacent rooms.

The invention will be described further, by way of  
15 example, with reference to the accompanying diagrammatic  
and not to scale drawing. The single illustration in the  
drawing shows symbolically the structure and use of a LAN  
radio data network designed according to the invention.

20 The data network 11 is operated by way of radio  
modules 12 for bidirectional data transmission radio links  
13. The radio modules 12 are each fitted directly with a  
transmitting/receiving aerial 14 and with a standard serial  
interface 26 having plug or socket 15 (preferably RSD 232;  
25 or TTL 485). Each radio module 12 contains, in front of a  
transmitting/receiving aerial change-over switch 16, a very  
high frequency transmitter of very limited transmitting  
power (around 25 milliwatts), which works with a bandwidth

of for instance one megahertz in the ISM band (433 - 434 MHz), that is in the frequency range of the non-public mobile radiotelephony and remote-control traffic which is free of telephone charges. With this design, bidirectional transmission rates up to almost 20 kBaud can be achieved, if one channel pattern is dispensed with, which is easily possible for the case of application of a data network 11. With a quartz-stabilised transmitter 17, a free-field distance in the order of 1 km between two radio modules 12 of this equipment can be bridged, in a less expensive layout with a surface acoustic wave filter still about half this distance. It is crucial that the relatively low transmitter frequency with propagation in buildings is attenuated and reflected to a comparatively slight extent so that, according to the building materials, a room or storey bridging can be realised up to in the order of 250 metres.

The modulated transmitter frequency comprises as information the data stream 18 and an identification signal 19, which are transmitted by way of a coding stage 20 as modulation information 21 to the transmitter 17 or from the receiver 22 as demodulated information 23 for decoding to a decoding stage 20. The identification signal 19 is supplied by an identification signal device 24 which can be the component of an intermediate store 25. The serial information transmission to the interface plug 15 takes place by way of the interface 26 for the reception of

information - to be sent out - by way of the standard connection 3 and for the output of received information by way of the standard connection 2; moreover the interface 26 in the radio module 12 supplies a switching information 27 to the aerial change-over switch 16 in order to switch the aerial 14 away from the receiver 22 over to the transmitter 17 during input of an item of information to be transmitted.

10       The apparatus, for instance a host server PC 28 (to which the radio module 12 with its directly attached aerial 14 is adapted to be connected by way of the plug-in interface 15,26) also has available at its interface 26 an interface plug or socket 15. The interfaces 26-26 control 15 the both-way data acceptance by way of the standard connection No. 6.

Identical radio modules 12 are located for instance at a telecom/telefax jack 29, on a user PC 30, on a printer 20 31 centrally installed for multiple access, on a manual peripheral device 32, on a vehicle 33 and on a stationary data acquisition station 34. Only the direct connection to a telecom/fax jack 35 requires a specially adapted interface 26 for the conversion of the (outgoing or 25 incoming) data stream, bearing in mind the standardised telefax protocol.

The identification signal 19 is usefully a

transmitter identification. In order to avoid a radio module 12 processing data by way of its receiver 22, which is not at all necessary here, the demodulated received information 23 is only switched through for decoding when the received information in connection with the data set also carried a corresponding identification signal 19. Owing to the transmitter identification, a receive item of information is thus only processed further when the predetermined "correct" transmitter 17 supplies the relevant receivable data stream.

The invention is not confined to details of the foregoing example, and many variations and modifications are possible within the scope of the invention as defined by the appended claims.

Thus, for example, the identification code or signal stored in the device 24 of any module may be the receiver code (addressee code) for that module, and the identification signal transmitted by that module may be determined by a further stored code or codes, or may be included in the data (as a prefix) supplied to the module.

Further, in, for example, a computer controlled system, the system may have a general identification signal to which is appended individual identification-sub-signals for each individual module, the module attached to the computer being set to receive all transmissions prefixed by

the general system identification signal whilst being able to address each other module individually. Said identification signals, or some thereof, may be settable or re-settable by a user of the system.

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In the embodiment shown in the drawing, the circuitry in the module, except for the receiver 22, is normally switched off, i.e. the module assumes a battery saving standby mode, and the circuitry is energised or switched to  
10 an operational mode when the receiver receives its respective identification signal in an incoming transmission and/or when the interface receives an input to be transmitted by the module; and this function as well as the spurious signal suppression by means of identification  
15 signals may be adopted for further uses.

For example, by replacing the interface 15,26 with a loudspeaker and/or microphone (and appropriate adjustment of the circuitry), a radio, listening device or two-way  
20 radio may be created in a simple manner in which acoustic information is converted to and/or from electrical information for modulating a transmission or from a demodulated transmission.

25 Further, by replacing the aerial 14 with a mains plug connector (and a protective circuit), a mains carried communication module can be created, and the transmission signal frequency may be varied to suit mains transmission.

The invention further includes and provides a module or system having any novel part or operational arrangement or functional feature disclosed herein or in the drawing; or any mechanical, electrical or operational equivalent thereof; or any novel combination thereof. For example, the two aspects could be combined for particular purposes, e.g. the module on the vehicle 12 could actuate a voice unit in the cab, or the module could be situated in the cab and comprise a loudspeaker, e.g. for giving a driver instructions when the vehicle/load is being weighed.

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CLAIMS

1. Radio information transmission system, characterised by radio modules equipped with transmitter, receiver and directly connected aerial, these radio modules comprising a directly pluggable standard serial interface for external connection to a PC, to a peripheral device and/or to a stationary or mobile data acquisition station.
2. A system according to Claim 1, further comprising at least one radio module which is equipped with an interface for direct connection to telefax jack.
3. A system according to Claim 1 or 2, characterised in that the radio modules emit, by way of their serial interface, accepted data according to radio-accurate coding in combination with an identification signal for actuation of the receivers in certain others of the radio modules in the very high frequency range.
4. An information transmission system, such as one according to any one of the preceding claims, and comprising at least one transmitter separate from a receiver, and characterised in that together with other modulated information, identification signals are transmitted by radio or by way of wire by the transmitter to switch on only the predetermined receiver or receivers for demodulation of the information.

5. A system according to Claim 4, characterised in that the transmitter is a telephone, listening or monitoring station and the receiver is the specifically addressed loudspeaker for emitting acoustic information derived from demodulated transmissions from said station.

6. A module or system comprising any novel part, functional arrangement or operational feature disclosed herein or in the accompanying drawing.

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7. A module or system substantially as hereinbefore described with reference to or as shown in the accompanying drawing.

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